AMENDMENTS TO THE CLAIMS

1. (Currently amended) A system for conditioning scale on the surface of a metal object comprising:

at least one nozzle adapted to spray droplets of an aqueous caustic solution;

at least one reservoir for containing said aqueous caustic solution communicating with said at least one nozzle;

a driving mechanism positioned to move the metal object relative to said at least one nozzle;

a temperature-sensing device positioned to sense the temperature of the surface of said metal object prior to the metal object passing said at least one nozzle,

a temperature modifier mechanism adjacent said temperature-sensing device, and

a control mechanism to control said temperature modifier mechanism responsive to the sensed temperature of the surface of said metal object to a temperature above the melting point of the ~~composite~~ caustic composition contained in the aqueous solution and below the temperature at which the Leidenfrost effect appears.

2. (Canceled)

3. (Original) The system as defined in claim 1 wherein there is at least a second nozzle adapted to spray droplets of a solution communicating with said reservoir, and with said control mechanism.

4. (Original) The system as defined in claim 1 wherein the control mechanism includes flow control devices to control the flow individually from each reservoir to said nozzle.

5. (Original) The system as defined in claim 1 wherein said metal object is a metal strip.

6. (Canceled)

7. (Original) The system as defined in claim 1 wherein an acid pickling station is provided.

8. (Canceled)

9. (Canceled)

10. (Currently amended) The system as defined in claim 1 wherein there is a speed sensing device to sense the speed of said metal object, and said control mechanism ~~device~~ is configured to vary the flow of said aqueous caustic solution responsive to the sensed speed of the metal object.

11 – 22 (Canceled)

23. (Withdrawn) An aqueous solution comprised of a mixture of sodium hydroxide and potassium hydroxide, wherein there is between about 15% and about 65% solids by weight.

24. (Withdrawn) The solution as defined in claim 23 wherein there is between 35% and 45% by weight solids.

25. (Withdrawn) The solution as defined in claim 23 wherein there is about 40% by weight solids.

26. (Withdrawn) The solution as defined in claim 23 wherein the mixture of sodium hydroxide and potassium hydroxide is a eutectic mixture.

27. (Withdrawn) The solution as defined in claim 23 further characterized by an effective amount, up to about 1% by weight of solids of an alkali metal permanganate.

28. (Withdrawn) The solution as defined in claim 27 wherein the alkali metal permanganate is potassium permanganate.

29. (Canceled)

30. (Original) The system of claim 4 wherein:

a) the metal object has a composition and dimensions; and

b) the control mechanism flow control devices control said flow responsive to at least one of the group consisting of the composition and the dimensions of said metal object.

31. (Original) The system of claim 10, wherein:

a) the metal object has a composition and dimensions; and

b) the control mechanism flow control devices control said flow responsive to at least one of the group consisting of the composition and the dimensions of said metal object.

32. (Original) A system for conditioning scale on the surface of a metal object comprising:

a first reservoir containing an aqueous caustic solution;

a second reservoir containing a second liquid solution;

at least one nozzle communicating with said first and second reservoirs and adapted to spray an atomized mist of a treatment mixture of said aqueous caustic solution and said second liquid solution and thereby cause the treatment mixture to engage the surface of the metal object, said treatment mixture having a concentration of the aqueous caustic solution and a concentration of the second liquid solution;

a driving mechanism positioned to move the metal object at a rate relative to said at least one nozzle and thereby passing said at least one nozzle; and

a control mechanism in communication with said at least one nozzle, the control mechanism configured to control the flow rate of said treatment mixture through said at least one nozzle as an atomized mist engaging said metal object surface.

33. (Original) The system of claim 32, wherein the metal object has a surface temperature, further comprising:

a temperature-sensing device in communication with said control mechanism and positioned to sense the surface temperature of said metal object prior to the metal object passing said at least one nozzle;

a temperature control system in responsive communication with said control mechanism and positioned to increase or decrease the temperature of said metal object prior to the metal object passing said at least one nozzle;

wherein said control mechanism directs the temperature control system to increase or decrease the surface temperature of said metal object prior to the metal object surface engaging said atomized treatment mist responsive to the temperature-sensing device.

34. (Original) The system of claim 33, wherein the atomized treatment mixture comprises at least one salt having a melting point, and wherein the control mechanism is configured to direct the temperature control system to increase or decrease the surface temperature of said metal object prior to the metal object surface engaging said atomized treatment mist to a temperature above said salt melting point and below the temperature at which the Leidenfrost effect appears on said metal object surface.

35. (Original) The system of claim 34 wherein the atomized treatment mixture mist engages the surface of the metal object in an oxidizing atmosphere.

36. (Currently amended) The system of claim ~~35~~ 34, further comprising a surface analyzer in communication with said control mechanism and positioned to measure a degree of surface conditioning of said metal object surface after said surface has been engaged by said atomized treatment mist, wherein the control mechanism is further configured to control the flow rate of said treatment mixture through said at least one nozzle responsive to the degree of surface conditioning measured by the surface analyzer.

37. (Original) The system of claim 36, further comprising a speed sensing device in communication with said control mechanism and positioned to measure the rate at which said metal object surface passes said at least one nozzle, wherein the control mechanism is further configured to control the flow rate of said treatment mixture through said at least one nozzle responsive to the speed sensing device.

38. (Original) The system of claim 32, further comprising:

a flow monitor in series with the at least one nozzle configured to monitor the flow of the treatment mixture through said nozzle, said monitor communicating with the control mechanism; and

at least a second nozzle in communication with said control mechanism and said first and second reservoirs and adapted to spray an atomized mist of a treatment mixture of said aqueous caustic solution and said second liquid solution and thereby cause the treatment mixture to engage the surface of the metal object;

wherein said control mechanism operates said second nozzle responsive to said flow monitor.

39. (Original) The system of claim 38 wherein the control mechanism is furthered configured to operate said second nozzle responsive to the degree of surface conditioning measured by the surface analyzer.

40. (Original) The system of claim 5 further comprising a surface condition analyzer in communication with said control mechanism and positioned to measure a degree of surface conditioning of said metal strip after said strip has been engaged by the spray droplets, wherein the control mechanism is further configured to control a flow rate of said aqueous caustic solution through said at least one nozzle responsive to the degree of surface conditioning measured by the surface analyzer.

41. (Canceled)

42. (Canceled)

43. (Currently amended) The system of Claim 8 further comprising a heating mechanism disposed to heat the surface of the metal object prior to the metal object passing said temperature-sensing device to a temperature above the melting point of the caustic composition contained in the aqueous solution.

44. (Original) The system of claim 32, wherein the metal object has a composition, and wherein the control mechanism is further configured to vary the concentration of said first aqueous caustic solution and vary the concentration of the second liquid solution within said treatment mixture responsive to the composition of said metal object.

45. (Original) The system of claim 36, wherein the metal object has a composition and dimensions, and wherein the control mechanism is further configured to vary the concentration of said first aqueous caustic solution and vary the concentration of the second liquid solution within said treatment mixture responsive to at least one of the group consisting of the composition of said metal object, the dimensions of said metal object, and the degree of surface conditioning measured by the surface analyzer.

46. (New) A system for conditioning scale on the surface of a metal object comprising:

first and second nozzles adapted to spray droplets of an aqueous caustic solution;

two reservoirs for containing said aqueous caustic solution communicating with said at least one nozzle;

a driving mechanism positioned to move the metal object relative to said at least one nozzle;

a temperature-sensing device positioned to sense the temperature of the surface of said metal object prior to the metal object passing said nozzles,

a cooling mechanism adjacent said temperature-sensing device,

a control mechanism to control said cooling mechanism responsive to the sensed temperature of the surface of said metal object to a temperature above the melting point of the caustic composition contained in the aqueous solution and below the temperature at which the Leidenfrost effect appears; and

wherein said first and second nozzles communicate with said reservoirs and said control mechanism.

47. (New) A system for conditioning scale on the surface of a metal object comprising:

at least a first and second nozzle adapted to spray droplets of an aqueous caustic solution;

at least one reservoir for containing said aqueous caustic solution communicating with said at least one nozzle;

a driving mechanism positioned to move the metal object relative to said at least one nozzle;

a temperature-sensing device positioned to sense the temperature of the surface of said metal object prior to the metal object passing said at least one nozzle,

a cooling mechanism adjacent said temperature-sensing device, and

a control mechanism to control said temperature modifier mechanism responsive to the sensed temperature of the surface of said metal object to a temperature above the melting point of the caustic composition contained in the aqueous solution and below the temperature at which the Leidenfrost effect appears;

wherein said metal object is a metal strip;

wherein there is at least one nozzle disposed on each side of said strip; and

being further characterized by a surface coverage analyzer adjacent at least one nozzle on each side of said strip.